

Liebert Distribution Monitoring (LDM)

User Manual

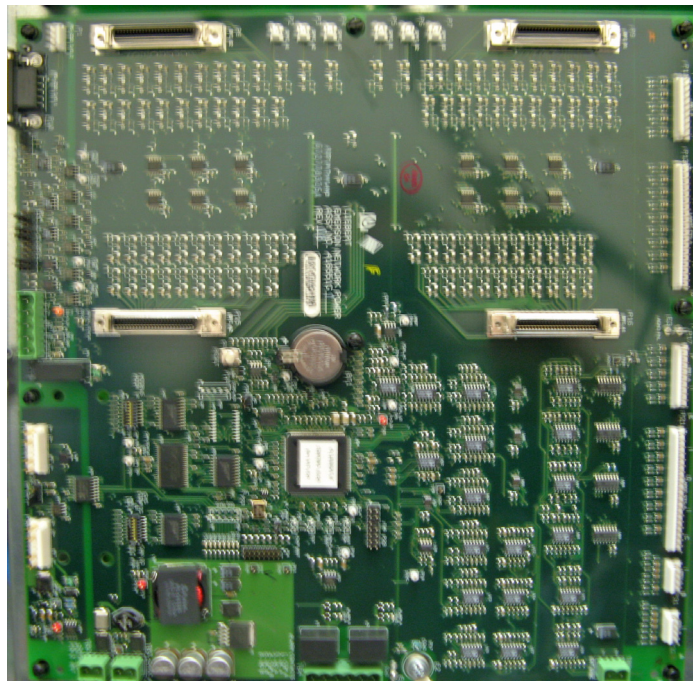


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SAFETY INSTRUCTIONS



WARNING

As with all types of electrical equipment, dangerous voltages exist within the equipment where the Liebert Distribution Monitor (LDM) is installed. For maximum safety, ensure power is removed and circuit breakers/disconnects are tagged/locked out per all applicable national, state and local electrical codes prior to working inside equipment.

The area around the equipment must be free of any debris or standing water.

All power and control wiring must be installed by a qualified electrician in accordance with the NEC and all applicable national, state and local codes.

ONLY qualified service personnel should perform maintenance and/or service on the Liebert LDM. When performing maintenance and/or service on any component, verify test equipment is insulated and has been inspected prior to use.

To avoid damage to the circuit boards, personnel handling these components should be wearing an Electrostatic Discharge strap or other approved protective device.

When replacing or installing a solid core Current Transformer (CT), power must be removed from equipment to prevent damage to the CT and/or circuit board. If the CT is a split-core design, follow proper electrical safety procedures.

These safety precautions are to be used in conjunction with NEC and local/state electrical code.

1.0 GLOSSARY OF ABBREVIATIONS

The following abbreviations are used in this manual.

BCB	Branch Circuit Monitoring Control Board
BCMS	Branch Circuit Monitoring System
BMS	Building Management System
BSM	BCMS Sensor Module
DSP	Digital Signal Processor
GUI	Graphical User Interface
IGM	Information Gathering Module
LDM	Liebert Distribution Monitor
LIB	Large Interface Board
OCWC	OpenComms Web Card
PBVI	Panelboard Voltage Current
PCD	Power Conditioning Device
PDU	Power Distribution Unit
STP	Service Terminal Protocol

2.0 PRODUCT OVERVIEW

The Liebert Distribution Monitor (LDM) monitors the main panelboard circuit breaker and individual panelboard branch circuit breakers. The measurements are used to report the current and alarm conditions for each breaker. The Liebert LDM utilizes branch circuit sensor modules and individual current transformers (CT) to monitor current. In addition, the Liebert LDM monitors options like subfeed and output circuit breakers and provides a full array of power parameters and alarms.

The Liebert LDM is available as an option for the Liebert PPC™ Precision Power Center, Liebert FDC™, Liebert FPC™ and Liebert RDC™ Remote Distribution Cabinet.

The Liebert LDM system can communicate with a Building Management System (BMS) and Liebert SiteScan® Web.

The Liebert LDM consists of a control board, panelboard voltage and current board, power supply boards and sensor modules and can monitor two 42-pole panelboards and three subfeed breakers.

The Liebert LDM is capable of receiving input from 21-pole current sensor modules; two sensor modules are required to monitor one 42-pole panelboard. The sensor module (BSM) contains twenty-one 50A current transformers (CTs) capsulated in an epoxy-filled plastic enclosure designed to be mounted next to the panelboard. Sensor modules are designed to work with Square D™ and GE panelboards. If a sensor module CT fails, connections are provided for up to six replacement CTs. The optional CTs can be attached directly to the load cable feeding the failed CT.

For branch breakers larger than 50A, discrete 100A rated large branch current transformers can be added. Higher-rated CTs can be used for monitoring optional subfeed circuit breakers. For subfeed breakers, like main panelboard breakers, the Liebert LDM monitors not only the 3-phase current but also the ground and neutral current. These subfeed circuit breakers are in addition to the 42 panelboard circuit breakers that can be monitored through the BSM. The Liebert LDM can accommodate 18 individual large current transformers.

If your Liebert power center is supplied with a Square D I-Line® panelboard, the Liebert LDM can also monitor it as well as its output breakers. A large interface board (LIB) replaces the panelboard voltage and current board and can monitor up to 42 poles. Each LIB can monitor eight 5-wire I-Line and/or subfeed breakers including ground and neutral current. There can be 1 or 2 LIBs per control board that can monitor a total of sixteen 5-wire I-Line and/or subfeed breakers.

The Liebert LDM has a Modbus port on the BCB for direct communication with a building management system (BMS). The Liebert LDM can communicate with Liebert SiteScan by using a Liebert SiteLink™ communication device. A Liebert SiteLink-2E™ is available as an option with the Liebert LDM and is mounted in the power center. Modbus Registry Summary documentation can be found at:

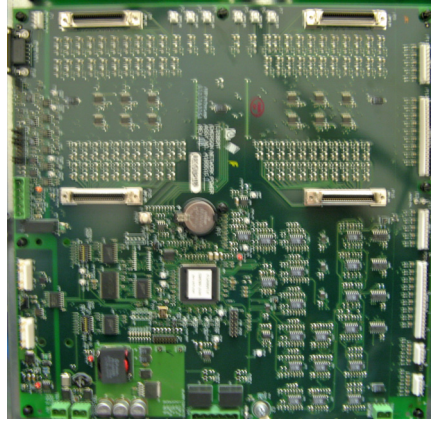
http://www.liebert.com/product_pages/ProductDocumentation.aspx?id=72

Click on the link for the Liebert Distribution Monitor (LDM Toolkit). Save the file to a desktop or laptop computer (PC) and extract the contents.

3.0 MAJOR COMPONENTS

3.1 Branch Circuit Monitoring Control Board (BCB)

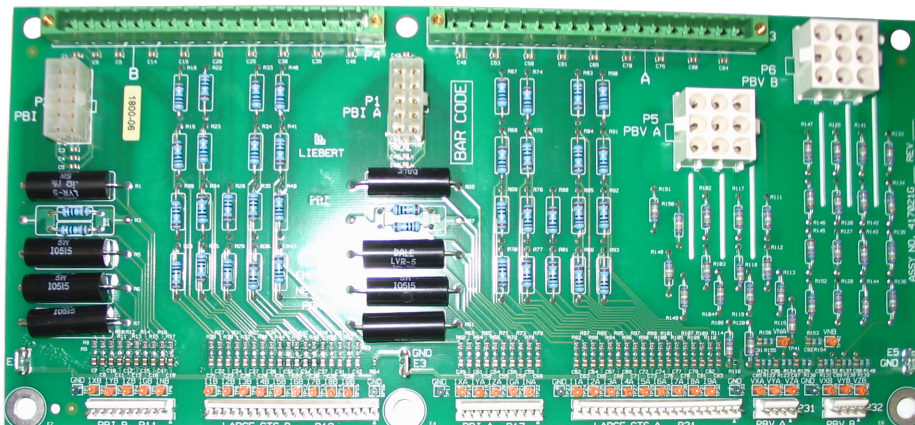
The BCB is the main processing and storage circuit board of the Liebert LDM. It is a DSP-based logic controller with internal flash memory and non-volatile memory. The BCB also includes a battery-backed real time clock.



One of the power parameters, kilowatt-hours (kWh), data is accumulated on this board for the panel-board mains, subfeeds and each branch circuit breaker. A Modbus command is provided to reset all accumulated power usage.

3.2 Panel Board Voltage-Current Board (PBVI)

The PBVI board monitors two panelboards and provides the voltage attenuators for the two panelboard voltages. The two sets of panelboard main breaker CTs are connected to the PBVI board.



Connections for the 18 large branch CTs are located on the PBVI board. The nine CTs on the A side of the board are normally associated with the A-side voltages for power calculations. The B-side CTs are normally associated with the B-side voltages. A cross-configuration tool allows changing that association for subfeeds.

The 18 large branch CT inputs can also be used to monitor up to three subfeed circuit breakers. This is configured using the Configuration tool (see **5.5 - Using the Configuration Tool**). The CTs from the B side of the PBVI are cross-configured to the A side so that the three sub-feeds appear within the A-side panelboard register space. The 18 large branch breakers require CTs with 1A secondary.



WARNING

Before connecting a large CT to the PBVI board, note the CT **MUST** have 1A secondary. Connecting a 5A secondary type CT will damage the board and the CT.

To ensure the proper current ratio and accuracy, the CTs should be purchased through Emerson Network Power. See **Table 1** for details. Contact your local Emerson Network Power representative or call Liebert Services at 1-800-LIEBERT (1-800-543-2378).

Table 1 CT matrix for the Liebert LDM

Part Number	Description	Phase CT	Ground CT	Neutral CT
528415G1-L	3 pole 100A Subfeed Breaker 5W CT Kit 23" Frame	100:1	100:1	200:1
528415G2-L	3 pole 125-225A Subfeed Breaker 5W CT Kit 23" Frame	200:1	100:1	500:1
528415G3-L	3 pole 250-400A Subfeed Breaker 5W CT Kit 23" Frame	500:1	100:1	500:1
531461G6-L	3 pole 0-100A I-Line & Subfeed Breaker 5W CT Kit 47" Frame	200:1	100:1	200:1
531461G9-L	3 pole 125-225A I-Line & Subfeed Breaker 5W CT Kit 47" Frame	200:1	100:1	500:1
531461G12-L	3 pole 250-400A I-Line & Subfeed Breaker 5W CT Kit 47" Frame	500:1	100:1	500:1
531461G18-L	3 pole 0-225A I-Line Breaker 3W CT Kit 47" Frame	200:1	—	—
531461G19-L	3 pole 250-400A I-Line Breaker 3W CT Kit 47" Frame	200:1	—	—
528461G13-L	1 pole 0-100A Branch Breaker CT Kit	100:1	—	—
528415G14-L	2 pole 0-100A Branch Breaker CT Kit	100:1	—	—
528415G15-L	3 pole 0-100A Branch Breaker CT Kit	100:1	—	—

3.3 Large Interface Board (LIB)

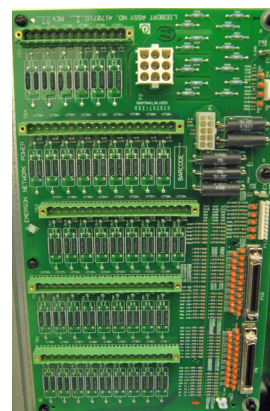
The LIB provides the voltage attenuators for Square D I-Line panelboard voltages. The LIB monitors the current for the I-Line panelboard. The panelboard input CTs are connected to the LIB board. There are 42 CT inputs provided. The current inputs require the use of 1A secondary CT.



WARNING

Before connecting a large CT to the PBVI board, note the CT **MUST** have 1A secondary. Connecting a 5A secondary type CT will damage the board and the CT.

To ensure the proper current ratio and accuracy, the CTs should be purchased through Emerson Network Power. See **Table 1** for details. Contact your local Emerson Network Power representative or call Liebert Services at 1-800-LIEBERT (1-800-543-2378).



There can be up to two LIB boards per control board for a maximum total of sixteen 5-wire output breakers.

3.4 Branch Circuit Monitoring Sensor Module (BSM)

The BSM—more commonly referred to as the CT Module—is packaged in an epoxy-filled plastic assembly. There are two designs: one for 1" center-to-center GE panelboards and one for 3/4" center-to-center for Square D panelboards. Each contains twenty-one 50A CTs that are rated up to 50A RMS 50/60 Hz.



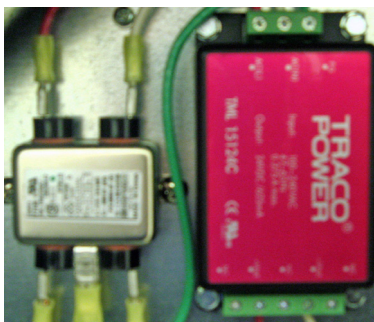
NOTE

The diameter of each CT hole is 0.354" (9mm). Wire diameter and thickness of insulation cannot be larger than the CT opening.

For the 42-breaker position in-line panel boards, the Square D CT Module is designed to interlock end to end to maintain alignment between the breaker poles and the CT Module.

3.5 Power Supply Assembly (with EMI Filter)

The power supply assembly is 120-240VAC (range +6, -13%) 50/60 Hz input, 24VDC output to provide logic level power for the BCB.



4.0 INSTALLATION



WARNING

Dangerous voltages exist in power distribution units and power conditioning units. To ensure maximum safety, all circuits breakers in the panelboard should be removed of power and the input feeder breaker should be turned off and locked-out in accordance with NEC and local/state code.



NOTE

Installation of Liebert LDM components or other monitoring devices should be performed by qualified personnel only.

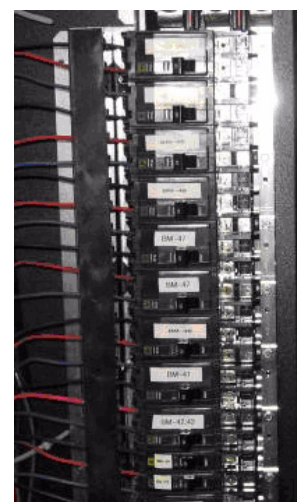
This section provides instructions for installing and connecting Liebert LDM current transformers. If service needs to be performed on any Liebert LDM component, contact Emerson Network Power Liebert Services at 1-800-LIEBERT (1-800-543-2378) for assistance.

4.1 Installing a BSM (CT Module Assembly)

In most cases the BSM—the **CT Module**—is factory-installed and no further work is required. If you need to add a CT Module, it attaches easily to the side of a panelboard to monitor any combination of 1-, 2- and 3-pole circuit breakers.

- For **side-by-side panelboards** (21 circuits on each side), attach one CT Module to each side of the panelboard, ensuring that the center of the CT hole lines up to the branch circuit breaker connection.
- For **SqD Inline panelboards** (42 circuits in a row), the two CT Modules must be interlocked to monitor 42 inline circuits. Flip the second, lower CT Module so that the two cutout sections line up, then attach the screws to secure the CT Modules to the panelboard.
- For **GE Inline type panelboards**, the two CT Modules fit end to end. Flip the second, lower CT Module so that the 50-pin ribbon cable connector, mounted on the bottom of the CT Module, lines up with the hole in the panelboard mounting bracket.

Install the circuit breakers according to the manufacturer's documentation. Route the circuit wire through the center of the CT and attach securely to the circuit breaker.

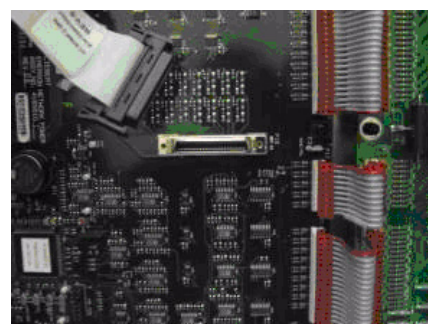


4.1.1 Connecting Panelboards A and B

The CT Module connects to the BCB via a 50-pin ribbon cable attached to the back of the CT Module. Route the ribbon cable and attach to the appropriate connector (see figure at right).

There are four connectors that are labeled for easy identification: two for **Panelboard A** (A1 and A2) and two for **Panelboard B** (B1 and B2).

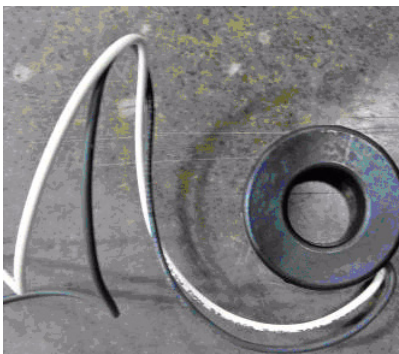
- Connect the CT module that will monitor Circuits 1-21 to the A1 or B1 connector, depending on whether the CT Module is connected to Panelboard A or B.
- Connect the CT module that will monitor Circuits 22-42 to the corresponding A2 or B2 connector.



Circuits Monitored	Panelboard A Connector	Panelboard B Connector
1-21	A1	B1
22-42	A2	B2

To configure branch circuits, see **5.5.12 - Adding a Circuit Breaker**.

4.2 Installing a Solid-Core Current Transformer



WARNING

A solid-core CT cannot be installed on a wire while current is flowing through the wire. Damage to burden resistor and CT will occur. Power needs to be removed prior to installing and/or removing any CT. CTs should be installed by qualified electricians only.

The CT for the panelboard main input circuit breaker is hard-wired to the connectors. Removing CT wires from the connector requires a pin extraction tool. Contact Liebert Services at 1-800-LIEBERT (1-800-543-2378) for assistance.



NOTE

When replacing or installing a CT, ensure the replacement CT has a secondary rating of 1A—for example, 100:1, 200:1 or 500:1. Using a higher-rated CT—for example, 100:5 or 500:5—will damage the burden resistors on the PBVI board.

Typically the three-phase and neutral wires utilize a CT rating of 100:1, 200:1 or 500:1, while the ground wire utilizes a CT rating of 100:1.

Route the circuit wire through the core of the CT and wire-tie the CT to the cable. Refer to the manufacturer's documentation for proper orientation to ensure accurate readings. Generally, CTs have an arrow, white dot or similar marking to indicate how to position the CT.

For the Liebert LDM, CTs have a white dot that must face the source on the three-phase wires and must face the load on the neutral and ground wires.



NOTE

When installing CTs for a large branch circuit breaker or subfeed, verify which monitoring board is installed.

- *A PBVI board can support one subfeed per panelboard (if neutral and ground will be monitored) or up to three subfeeds if neutral and ground are not monitored.*
- *One LIB can support up to eight output and/or subfeed breakers.*
- *Two LIB boards are provided to support up to 16 output and/or subfeed breakers.*

4.3 Connecting a Current Transformer to the PBVI Board

If subfeed breakers are ordered with the unit, the phase CTs are installed and wired to the PBVI. The neutral and ground CTs are also factory-supplied and wired to the PBVI board.

Since the CTs must be installed on the subfeed breaker's neutral and ground cables, they cannot be installed in the factory. They are located in the bottom of the unit in front of the transformer.

CTs have an arrow, white dot or similar marking that depicts how to position the CT on the cable to ensure accurate readings. The arrow, white dot or similar marking must face the load when installing the CT on the ground and neutral cable. Route the neutral and ground cable through the core of the CTs and wire-tie the CT to the cable.

If subfeed breakers are installed in the field, up to five CTs may be installed to monitor a subfeed breaker (three phases, neutral and ground). The neutral and ground CTs may be omitted if monitoring of neutral and ground is not required.

On large branch circuit breakers, ground and neutral is not monitored.

There are two 18-pin terminal blocks on the PBVI for large branch circuit breakers and/or subfeeds—one for Panelboard A and one for Panelboard B.

The circuit board is marked with a triangle ▼ to indicate Pin 1.

- Pin 1 should be used for the white wire of CT1 (Phase A)
- The black wire should be connected to Pin 2.
- The same pattern will follow for the remaining CTs.

After all CTs are installed, use the Configuration tool to label and set alarm parameters. To configure the Liebert LDM, see **5.5.11 - Add or Delete a Circuit Breaker**.

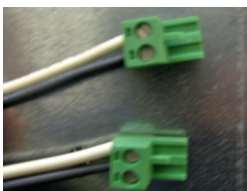
If the Power Distribution Center is supplied with optional isolated ground, the isolated ground circuit can be monitored by the Liebert LDM.

- Connect the isolated ground CT to Pins 17 and 18 on the two 18-pin terminal blocks on the PBVI.
- Connect the isolated ground CT white wire to Pin 17 and the CT black wire to Pin 18.

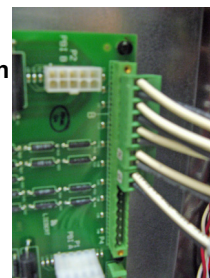
CTs for the three phases



CT for neutral and ground



Five CT connection



Refer to the following example and **Table 2** for wiring configuration details.

Example: When installing a subfeed breaker where the three phases, neutral and ground will be monitored, the CTs should be wired as follows:

Pin	Wiring	
1	Phase A CT	White wire
2	Phase A CT	Black wire
3	Phase B CT	White wire
4	Phase B CT	Black wire
5	Phase C CT	White wire
6	Phase C CT	Black wire
7	Neutral CT	White wire
8	Neutral CT	Black wire
9	Ground CT	White wire
10	Ground CT	Black wire

If neutral and ground will not be monitored, Pins 7-10 may be used instead for a second subfeed (Phase A and Phase B CTs).

4.4 CT Table for PBVI Board

Table 2 shows the configuration of large branch circuit breakers and their CT assignments.

Table 2 Wiring configuration of large branch circuit breakers

Configuration 1: Four Modules																				
Connector P3 (A)	Pins	▼	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color		W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B
	CT		CT1		CT2		CT3		CT4		CT5		CT6		CT7		CT8		CT9 or IG	
Connector P4 (B)	Pins	▼	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color		W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B
	CT		CT10		CT11		CT12		CT13		CT14		CT15		CT16		CT17		CT18 or IG	

Configuration 2: Two Modules With Large Branch Breaker CTs																				
Connector P3 (A)	Pins	▼	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color		W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B
	CT		LB1		LB2		LB3		LB4		LB5		LB6		LB7		LB8		LB9 or IG	
Connector P4 (B)	Pins	▼	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color		W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B
	CT		LB10		LB11		LB12		LB13		LB14		LB15		LB16		LB17		LB18 or IG	

Configuration 3: Four Modules With Two 5-Wire Subfeed Breaker CTs																				
Connector P3 (A)	Pins	▼	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color		W	B	W	B	W	B	W	B	W	B								
	CT		LB1		LB2		LB3		LB4		LB5							IG		
	Phase		A1		B1		C1		N1		G1									
Connector P4 (B)	Pins	▼	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color		W	B	W	B	W	B	W	B	W	B								
	CT		LB6		LB7		LB8		LB9		LB10							IG		
	Phase		A2		B2		C2		N2		G2									

Configuration 4: Four Modules With Three 5-Wire Subfeed Breaker CTs																				
Connector P3 (A)	Pins	▼1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	Wire Color	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	
	CT	LB1		LB2		LB3		LB4		LB5		LB11		LB12				IG		
	Phase	A1		B1		C1		N1		G1		N3		G3						
Connector P4 (B)	Pins	▼1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	Wire Color	W	B	W	B	W	B	W	B	W	B	W	B	W	B					
	CT	LB6		LB7		LB8		LB9		LB10		LB11		LB12		LB13		IG		
	Phase	A2		B2		C2		N2		G2		A3		B3		C3				

W = White
B = Black

IG = Isolated Ground CT
LB = Large Branch Breaker CT

A = A Phase CT
B = B Phase CT
C = C Phase CT

N = Neutral CT
G = Ground CT

Table 2 Wiring configuration of large branch circuit breakers (continued)

Configuration 5: Four Modules With Six 3-Wire Subfeed Breaker CTs																			
Connector P3 (A)	Pins	▼1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B
	CT	LB1		LB2		LB3		LB4		LB5		LB6		LB7		LB8		LB9	
	Phase	A1		B1		C1		A2		B2		C2		A3		B3		C3	
Connector P4 (B)	Pins	▼1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B
	CT	LB10		LB11		LB12		LB13		LB14		LB15		LB16		LB17		LB18	
	Phase	A4		B4		C4		A5		B5		C5		A6		B6		C6	

Configuration 6: Three Modules With Nine Large Branch Breaker CTs																			
Connector P3 (A)	Pins	▼1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Wire Color	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B
	CT	LB1		LB2		LB3		LB4		LB5		LB6		LB7		LB8		LB9 or IG	
Connector P4 (B)	Pins	▼1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

W = White
B = Black

IG = Isolated Ground CT
LB = Large Branch Breaker CT

A = A Phase CT
B = B Phase CT
C = C Phase CT

N = Neutral CT
G = Ground CT

4.5 Connecting a Current Transformer to the LIB Board

LIB can monitor eight 5-wire output/subfeed breakers. Two LIB boards are provided to support up to 16 output and/or subfeed breakers. If subfeed breakers are ordered with the unit, the phase CTs are installed and wired to the LIB. The neutral and ground CTs are also factory-supplied and wired to the LIB.

Since the CTs must be installed on the subfeed breaker's neutral and ground cables, they cannot be installed in the factory. They are located in the bottom of the unit in front of the transformer.

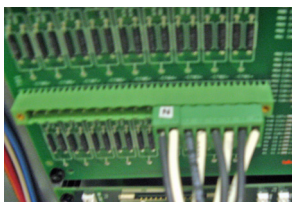
CTs have an arrow, white dot or similar marking that depicts how to position the CT to ensure accurate readings. The arrow, white dot or similar marking must face the load when installing the CT on the ground and neutral cable. Route the neutral and ground cable through the core of the CTs and wire-tie the CT to the cable.

If subfeed breakers are installed in the field, up to five CTs may be installed to monitor a subfeed breaker (three phases, neutral and ground). The neutral and ground CTs may be omitted if monitoring of neutral and ground is not required.

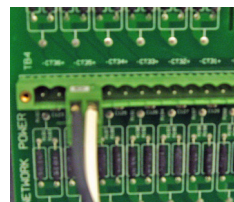
The designators on the LIB are different from those on the PBVI board.

- CT1 (Phase A white wire) begins on TB1 CT1+ and the black wire connects to CT1-.
- The Ground CT for the first subfeed/output circuit breaker connects to TB4 CT35.

**Four CTs
(three phases
and neutral)**



Ground CT



Refer to the example below and **Tables 3** and **4** for wiring configuration details.

Example: The above pictures show how to install CTs for a subfeed or I-Line output circuit breaker with neutral and ground being monitoring. The CTs should be wired as follows:

First Breaker			Second Breaker		
CT1+	Phase A CT	White wire	CT5+	Phase A CT	White wire
CT1-	Phase A CT	Black wire	CT5-	Phase A CT	Black wire
CT2+	Phase B CT	White wire	CT6+	Phase B CT	White wire
CT2-	Phase B CT	Black wire	CT6-	Phase B CT	Black wire
CT3+	Phase C CT	White wire	CT7+	Phase C CT	White wire
CT3-	Phase C CT	Black wire	CT7-	Phase C CT	Black wire
CT4+	Neutral CT	White wire	CT8+	Neutral CT	White wire
CT4-	Neutral CT	Black wire	CT8-	Neutral CT	Black wire
CT35+	Ground CT	White wire	CT36+	Ground CT	White wire
CT35-	Ground CT	Black wire	CT36-	Ground CT	Black wire

If more output or subfeed CTs need to be installed, continue in the same pattern shown above.

- Connect the Phase A CT for the second breaker on CT5 (white wire to CT5+, black to CT5-).
- Connect the Ground CT for the second breaker to CT36 (white wire to CT36+, black to CT36-).
- Continue the same pattern until all CT connections are used or there are no more output or sub-feed CTs to add.

4.6 CT Table for LIB

Tables 3 and 4 show the CT assignments for 10 output breaker CTs and three subfeed breaker CTs with neutral and ground being monitored.

Table 3 Wiring configuration for LIB 1

Connector TB1	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W
	CT	CT9		CT8		CT7		CT6		CT5		CT4		CT3		CT2		CT1	
	Phase	A3		N2		C2		B2		A2		N1		C1		B1		A1	

Connector TB2	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W
	CT	CT18		CT17		CT16		CT15		CT14		CT13		CT12		CT11		CT10	
	Phase	B5		A5		N4		C4		B4		A4		N3		C3		B3	

Connector TB3	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W
	CT	CT27		CT26		CT25		CT24		CT23		CT22		CT21		CT20		CT19	
	Phase	C7		B7		A7		N6		C6		B6		A6		N5		C5	

Connector TB4	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W					B	W	B	W	B	W	B	W	B	W
	CT	CT2		CT1		NONE		NONE		CT32		CT31		CT30		CT29		CT28	
	Phase	G2		G1						N8		C8		B8		A8		N7	

Connector TB5	Pins	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W
	CT	CT8		CT7		CT6		CT5		CT4		CT3	
	Phase	G8		G7		G6		G5		G4		G3	

W = White
B = Black

A = A Phase
B = B Phase
C = C Phase

N = Neutral
G = Ground

Table 4 Wiring configuration for LIB2

Connector TB1	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W
	CT	CT41		CT40		CT39		CT38		CT37		CT36		CT35		CT34		CT33	
	Phase	A11		N10		C10		B10		A10		N9		C9		B9		A9	

Connector TB2	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W
	CT	CT50		CT49		CT48		CT47		CT46		CT45		CT44		CT43		CT42	
	Phase	B13		A13		N12		C12		B12		A12		N11		C11		B11	

Connector TB3	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W
	CT	NONE		NONE		NONE		NONE		NONE		NONE		NONE		CT52		CT51	
	Phase															N13		C13	

Connector TB4	Pins	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W					B	W	B	W	B	W	B	W	B	W
	CT	CT10		CT9		NONE		NONE		NONE		NONE		NONE		NONE		NONE	
	Phase	G10		G9															

Connector TB5	Pins	12	11	10	9	8	7	6	5	4	3	2	1
		-	+	-	+	-	+	-	+	-	+	-	+
	Wire Color	B	W	B	W	B	W	B	W	B	W	B	W
	CT	NONE		NONE		NONE		CT13		CT12		CT11	
	Phase							G13		G12		G11	

W = White

A = A Phase

N = Neutral

B = Black

B = B Phase

G = Ground

C = C Phase

5.0 OPERATION

The Liebert LDM is a factory-installed option to provide monitoring of the main breaker, branch circuit breakers and subfeed breakers. It may be installed in the Liebert PPC Precision Power Center, Liebert FDC, Liebert FPC and Liebert RDC Remote Distribution Cabinet.

Software available on Liebert's Web site (see **5.3 - Downloading the Software**) can be installed on a desktop or laptop computer (PC) to monitor status and configure breaker parameters and alarm set-points. These monitoring and configuration functions are described in **5.4 - Using the Monitor Tool** and **5.5 - Using the Configuration Tool**.

The Liebert LDM monitors and displays the parameters listed in **Table 5**.

Table 5 Parameters monitored for breakers

Parameters	Displayed and monitored for each:			
	Panelboard branch circuit breaker	Panelboard main circuit breaker and SqD I-Line panelboard	SqD I-Line panelboard circuit breaker	Subfeed circuit breaker
Voltage	—	✓	—	—
Line-to-line	—	✓	—	—
Line-to-neutral	—	✓	—	—
Phase Current	✓	✓	✓	✓
Neutral Current	—	✓	✓	✓
Ground Current	—	✓	✓	✓
kVA	—	✓	✓	✓
kW	✓	✓	✓	✓
kW-Hours	✓	✓	✓	✓
Percent Load	✓	✓	✓	✓
Power Factor	—	✓	✓	✓
Crest Factor	—	✓	✓	✓
Voltage Total Harmonic Distortion (THD)	—	✓	✓	✓
Current Total Harmonic Distortion (THD)	—	✓	✓	✓

Circuit identification and status of each breaker are also displayed. Parameters are updated every 500msec.

5.1 Alarms

The Liebert LDM constantly monitors configured parameters for normal values. When the unit detects an alarm condition, it annunciates and displays alarm messages via the Monitor program (see **5.4 - Using the Monitor Tool**).

Alarms must be manually reset after the alarm condition has been corrected and may be reset through Modbus.

To facilitate troubleshooting:

- All alarms are stored in non-volatile memory to protect against erasure by a power outage.
- Alarms are saved in an event log. The event log stores up to 128 events using a first-in, first-out format (FIFO).

All alarm thresholds for monitored parameters are adjustable by using the Configuration tool to match site requirements (see **5.5 - Using the Configuration Tool**).

Table 6 shows the types of alarms for the various types of breakers, along with a description, factory default setpoints and allowable range for each.

Table 6 Alarm conditions and factory setpoints

Alarm	Description	Default setting	Range
Branch Breakers			
• Overcurrent Warning	Current exceeds 75% of breaker amps	15A	0-75%
• Overcurrent Alarm	Current exceeds 80% of breaker amps	16A	10-80%
• Low Current Alarm	Minimum current level of a branch breaker	0%, which disables the alarm	0-70%
Panelboard Main Breaker and SqD I-Line Panelboard			
• Phase Overcurrent Warning	Current exceeds 75% of breaker amps	170A	0-75%
• Phase Overcurrent Alarm	Current exceeds 80% of breaker amps	180A	10-80%
• Neutral Overcurrent Alarm	Current exceeds 95% of breaker amps	214A	10-200%
• Ground Overcurrent Alarm	Current exceeds 5 amps	5A	1-50A
• Overvoltage Alarm	At least one of the line-to-line voltages exceeds +6% of nominal	—	0-50%
• Undervoltage Alarm	At least one of the line-to-line or line-to-neutral voltages falls below -13% of nominal	—	0-50%
Subfeed Breakers and I-Line Output Breakers			
• Phase Overcurrent Warning	Current exceeds 75% of breaker amps	170A	0-75%
• Phase Overcurrent Alarm	Current exceeds 80% of breaker amps	180A	10-80%
• Low Current Warning	Minimum current level of a branch breaker	0%, which disables the alarm	0-70%
• Neutral Overcurrent Alarm	Current exceeds 95% of breaker amps	214A	10-200%
• Ground Overcurrent Alarm	Current exceeds 5 amps	5A	1-50A
Summary Alarm	Detects and annunciates upon occurrence of any alarm	—	—
Panelboard Summary Alarm	Detects and annunciates upon occurrence of branch or panelboard main breaker alarm	—	—

5.2 Communication

5.2.1 LDM Setup Port Connection

Use the LDM Setup port to download and use the software from Liebert's Web site for monitoring, configuration and firmware upgrades (see **5.3 - Downloading the Software**). This port is **not** a terminal interface.

To connect to the LDM Setup port:

- Connect one end of a standard DB9 (female-female) null modem cable to a desktop or laptop computer (PC).
- Connect the other end of the cable to the LDM Setup port on the Liebert LDM, as shown below.



NOTE

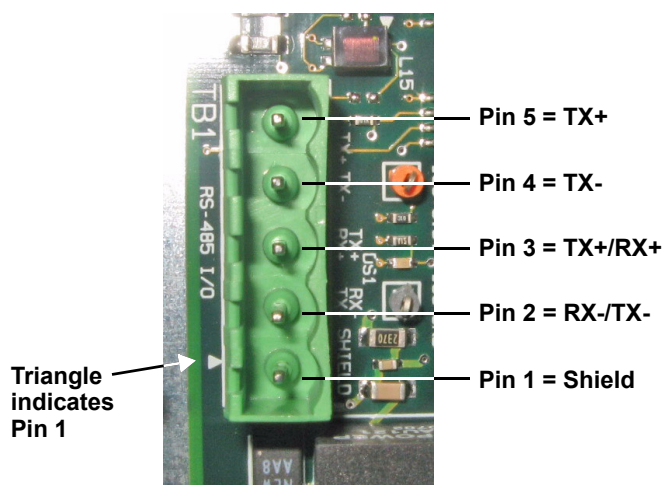
The images above are intended for illustration only. The location of the external port may vary.

5.2.2 Modbus Connection

Use the Modbus port for remote communication. The Liebert LDM supports 2- or 4-wire RS-485/422 connection (customer-installed).

To connect to the Modbus port:

- Look for Connector TB1 on the BCB. This is the RS-485 Modbus port.
- Refer to the following figure for proper connection points.



NOTE

The triangle printed on the circuit board depicts Pin 1.

5.3 Downloading the Software

The Liebert LDM has three software tools for monitoring, configuration and firmware updates:

- Monitoring - see **5.4 - Using the Monitor Tool**
- Configuration - see **5.5 - Using the Configuration Tool**
- Firmware updates - see **5.6 - Upgrading the Firmware**

These programs may be downloaded at no charge or license fee at Liebert's Web site at:

http://www.liebert.com/product_pages/ProductDocumentation.aspx?id=72



NOTE

The software may be updated and changed without any notification. Check the Web site regularly to ensure the software is up-to-date.

5.4 Using the Monitor Tool

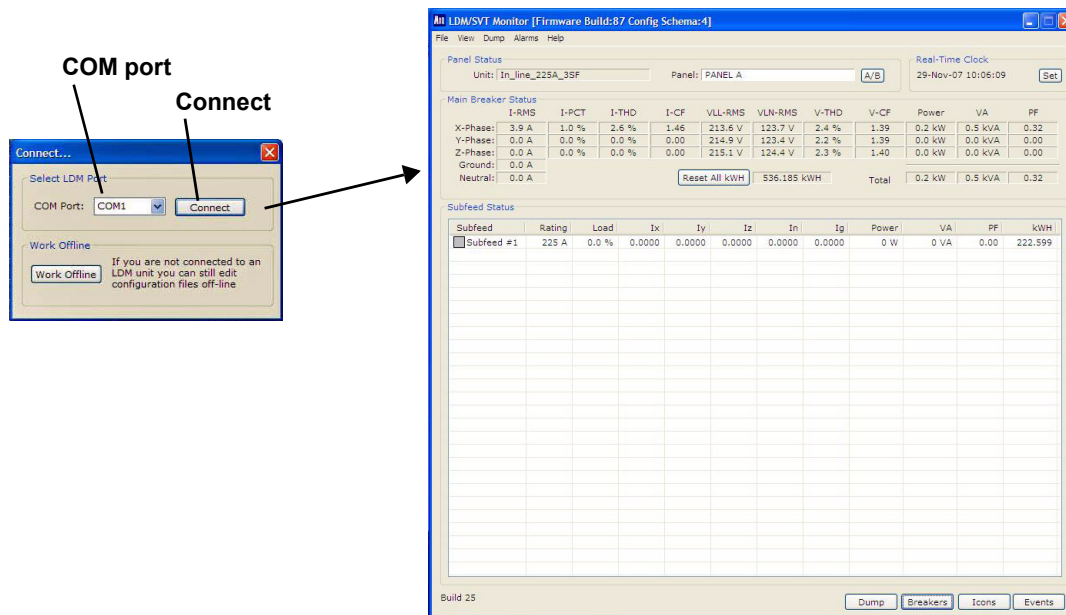
The Monitor tool supports service terminal connections through the LDM Setup port. The tool displays the following information:

- Main input voltage and currents
- Total power
- Individual branch circuit breaker currents
- Event log
- System clock (date and time)
- Reset kWh function

A special registry key may be installed in the PC to enable the auto-zero control option and provide access to a more in-depth event log. This diagnostic feature is reserved for use by Liebert Services and Emerson Network Power technical personnel.

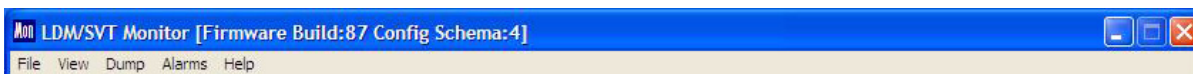
5.4.1 Starting the Monitor Tool

- If needed, download the latest version of the software (see **5.3 - Downloading the Software**).
- Run the executable file **Monitor-xx.exe** (where **xx** is the latest version) to start the Monitor tool.
- In the Connect window, select the appropriate COM port, shown below left. The dialog box lists available ports only. If a port is in use, it does not appear in the list.
- Click **Connect**.
- The Monitoring main window, below right, opens after communication is established.



5.4.2 Monitor Menu Options

The Monitor window has a menu bar at the top with a drop-down list of options for each menu. **Table 7** summarizes the options available in these menus.



Menu options

Table 7 Monitor menu options

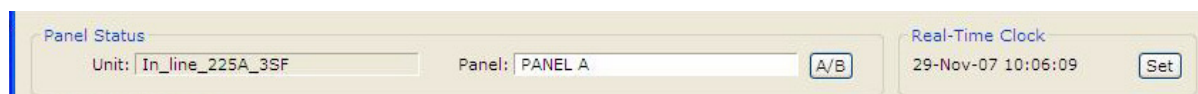
Menu Option	Function
File Menu	
• Exit	Terminates the monitoring session and closes the Monitor program.
View Menu	
• Event Logs	Opens the Event Log window, allowing users to view a list of events for Panel A or Panel B or system. Events are listed in order of occurrence, starting with the most recent.
• Breakers	Updates the status of all branch breakers for the selected panel in the Breaker Status area.
• Subfeeds	Updates the status of all subfeed breakers for the selected panel in the Breaker Status area.
Dump Menu	
• Readings	Downloads a .csv file with main breaker, branch circuit breaker and subfeed readings. The file may be viewed with a spreadsheet program such as Microsoft Excel.
• Event Log	Downloads a .csv file with the event log stored on the BCB. The file may be viewed with a spreadsheet program such as Microsoft Excel.
• Configuration	Downloads a .txt file with the configuration file stored on the BCB. The file includes scaling data, Panelboard A and B configurations, branch circuit values and CT ratio settings.
Alarms Menu	
Choose one of three options—Raw, Filtered or Latched—to specify how alarms are displayed. Note that alarms sent over Modbus are latched independent of changes performed in the Alarms menu.	
• Raw	The raw alarm state is the instantaneous state of the alarm. It is not filtered and has no hysteresis. When Raw is selected, an alarm is active whenever the latest reading exceeds the setpoint and is cleared as soon as the reading returns to a level within the setpoint range.
• Filtered	The filtered alarm uses the hysteresis interval to suppress transient alarms. A filtered alarm is cleared after the alarm condition remains cleared for longer than the hysteresis interval.
• Latched	Latched alarms behave like filtered alarms that get stuck on. A latched alarm stays active until the alarm is manually cleared.
• Clear All	Clears all latched alarms for the selected panel. Any alarm condition that is still active is latched again after the hysteresis interval passes.
Help Menu	
• About	Displays information about Liebert Distribution Monitoring.

5.4.3 Panel Status and Real-Time Clock

The Panel Status area displays:

- The name of the Liebert LDM in the Unit box.
- The currently selected panel in the Panel box.

To choose a different panel, click on the panel name or the **A/B** button. If the selected panel has any active alarms, the panel name appears in white text with a red background.

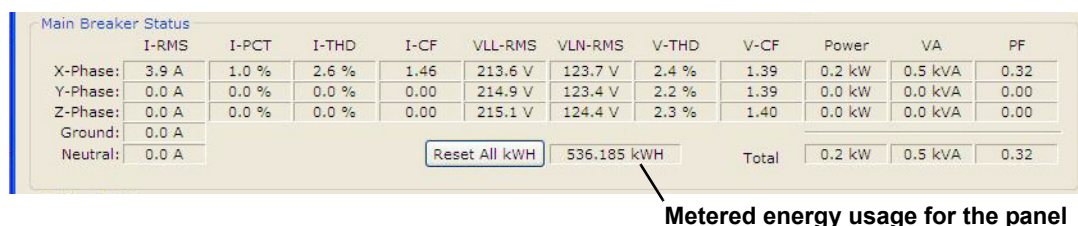


The Real-Time Clock displays the time as stored in the Liebert LDM unit. The time will not display correctly if the time zone is incorrect in the PC. If the time displayed is incorrect and the problem is not caused by a time-zone configuration problem:

- Click the **Set** button to force the real-time clock to synchronize with the time set on the PC.

5.4.4 Main Breaker Status

The Main Breaker Status area displays RMS current, percent load (PCT), total harmonic distortion (THD), crest factor (CF), line-to-line voltage (VLL-RMS), line-to-neutral voltage (VLN-RMS), instantaneous power (Power), VA and power factor (PF) for each input phase. If any phase voltage or current is in alarm, the associated field displays white text with a red background.



The metered energy usage for the panel is also displayed in kilowatt hours (kWh), as shown above. To clear all metering information, click the **Reset All kWh** button.



CAUTION

Exercise care before using the **Reset All kWh** button, which resets the kWh usage for the main breaker as well as all branch breakers and subfeed breakers on the panel.

5.4.5 Breaker Status

The Breaker Status area displays detailed status for every branch or subfeed breaker on the selected panel. The information may appear in a table or as icons, depending on the whether the **Table** or **Icons** button is active (see 5.4.6 - Mode Buttons).

The example below shows the table format with details for each breaker: type and rating, percent load, individual phase current in amps (I1, I2, I3), power, apparent power (VA), power factor (PF) and accumulated kilowatt hours (kWh.)

Breaker Status										
Breaker	Type/Rating	Load	I1	I2	I3	Power	VA	PF	kWh	
BREAKER #01	1-Pole 20 A	0.0 %	0.0000	---	---	0 W	0 VA	0.00	41.737	
BREAKER #02	1-Pole 20 A	0.0 %	0.0000	---	---	0 W	0 VA	0.00	123.211	
BREAKER #03	1-Pole 20 A	0.0 %	0.0000	---	---	0 W	0 VA	0.00	41.353	
BREAKER #04	1-Pole 20 A	0.0 %	0.0000	---	---	0 W	0 VA	0.00	15.379	
BREAKER #05	1-Pole 20 A	0.0 %	0.0000	---	---	0 W	0 VA	0.00	13.637	

5.4.6 Mode Buttons

Mode buttons at the bottom of the Monitor window allow users to download Monitor readings to a file, toggle the display between branch and subfeed breakers, toggle between table and icon views of breaker status data and view the Event Log. Additionally, Emerson Network Power technical personnel may control the auto-zero function if the diagnostic registry key is installed.

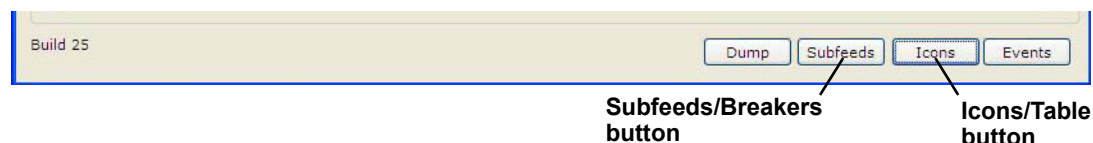


Table 8 Monitor mode buttons

Button	Function
Dump	Converts the Monitor readings into a spreadsheet format (.csv file format).
Subfeeds/Breakers	Toggles between the subfeed and branch breaker displays. The button label changes when the display is changed.
Icons/Table	Toggles between the tabular and icon views. The button label changes when the display is changed.
Events	Displays the Event Log dialog box.
Auto-Zero (not shown above)	Viewable only if the diagnostic registry key has been installed on the PC. Used by Emerson Network Power technical personnel for diagnostic purposes only.

5.5 Using the Configuration Tool

The Configuration tool allows users to set up breakers and view or change their parameters and alarm setpoints.



NOTE

End users are unable to create a configuration file. Only Emerson Network Power technical personnel can create a unique configuration file. Please contact your local Emerson Network Power representative or call Liebert Services at 1-800-LIEBERT (1-800-543-2378) for assistance.

5.5.1 Starting the Configuration Program

Before starting the Configuration tool, make sure you have the most recent version of the software and decide whether you want to connect to the Liebert LDM or work in offline mode.

Offline mode allows you to run the configuration tool without being connected to the equipment. (Prior to Version 25—*LDM-Config-25*—a service terminal connection was required to configure or monitor the Liebert LDM.)



NOTE

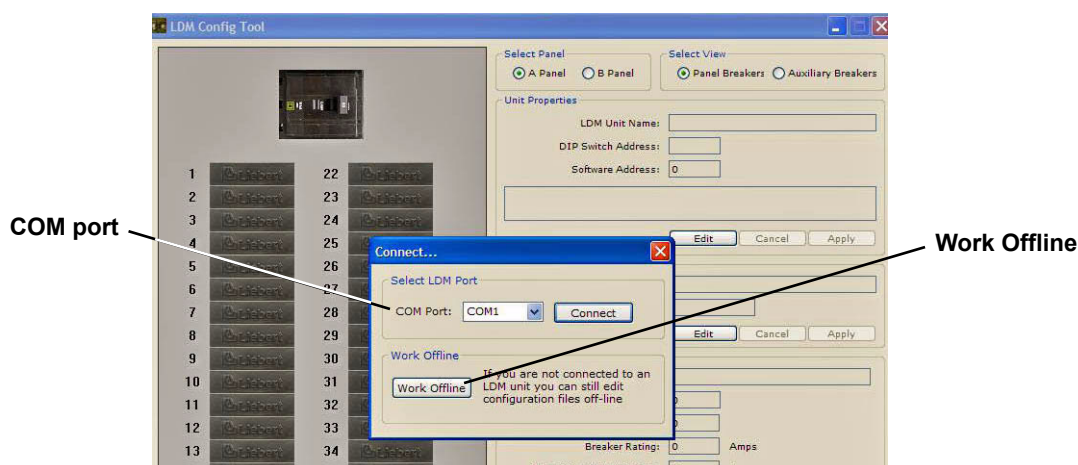
*A configuration file is required for Offline Mode. If one is not available, connect to the equipment locally and save the configuration to disk. See 5.5.4 - **Install Configuration Changes in the Unit** and 5.5.5 - **Save the Configuration File to Disk**.*

To Connect via COM Port

1. If needed, download the latest version of the software (see **5.3 - Downloading the Software**).
2. Connect a PC to the Liebert LDM via the external DB9 connection. Refer to **5.2.1 - LDM Setup Port Connection**.
3. Run the file **LDM-Config-xx.exe** (where **xx** is the version number) to start the Configuration program.
4. In the Connect window, select the appropriate COM port from the list of available ports.
5. Click **Connect**.

To Work in Offline Mode

1. If needed, download the latest version of the software (see **5.3 - Downloading the Software**).
2. Run the file **LDM-Config-xx.exe** (where **xx** is the version number) to start the Configuration program.
3. In the Connect window, click the **Work Offline** button, shown below.
4. When prompted for the configuration file, navigate to the location of the file.
5. Click **Open**.



Proceed to **5.5.2 - Main Configuration Window Overview** to begin configuration.

When a local connection to the Liebert LDM can be performed, load the configuration using the instructions in **5.5.3 - Load a Configuration File from Disk**.

5.5.2 Main Configuration Window Overview

The Configuration window shows breakers graphically in the left pane and associated breaker data at right. Selecting a breaker in the left pane changes the display of data in the right pane.

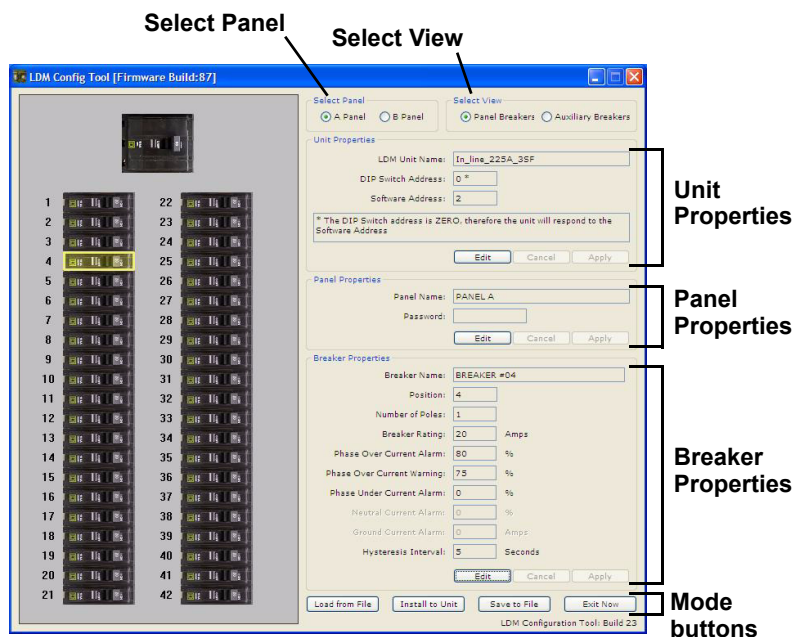


Table 9 shows the main sections of the window, along with a description and a reference to step-by-step instructions for each.

Table 9 Overview of main Configuration window

Section	Function	For details, see:
Select Panel	Toggles the display between Panel A and Panel B.	5.5.6 - Select Panel to View
Select View	Toggles between Panel and Auxiliary Breakers.	5.5.7 - Select Breakers to View
Unit Properties	Displays the name, DIP switch address and software address of the Liebert LDM unit.	5.5.8 - Edit the Liebert LDM Unit Properties
Panel Properties	Displays the name of the selected panelboard; also password setup for security purposes.	5.5.9 - Edit the Panel Properties or Set a Password
Breaker Properties	Displays breaker parameters and alarm setpoints.	5.5.10 - Edit the Breaker Properties
Configuration Mode Buttons		
• Load from File	Uploads a saved configuration file from the PC to the Liebert LDM. This feature may be used to install a backup copy of a configuration file or set up a new Liebert LDM installation.	5.5.3 - Load a Configuration File from Disk
• Install to Unit	Uploads the current configuration from the PC to the Liebert LDM after making changes to the configuration. This step is required to update the unit with the latest changes.	5.5.4 - Install Configuration Changes in the Unit
• Save to File	Saves a copy of the configuration file to the PC. This feature is useful when a backup copy of the configuration file is needed.	5.5.5 - Save the Configuration File to Disk
• Exit Now	Closes the Configuration program.	—

5.5.3 Load a Configuration File from Disk

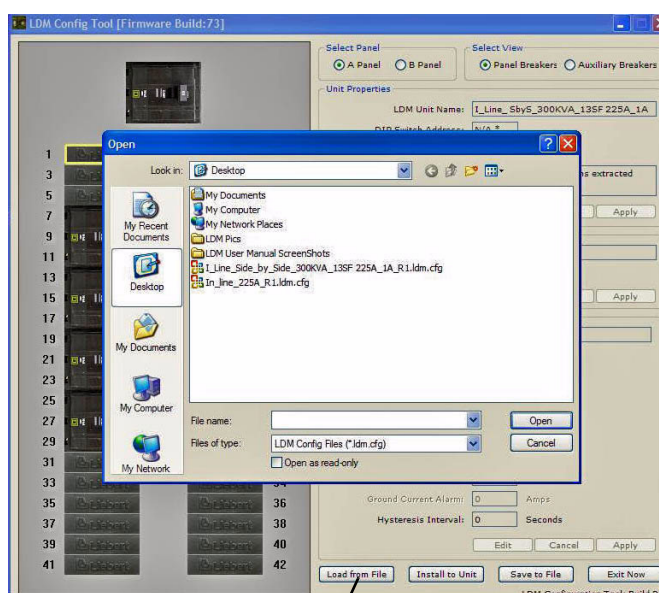
A previously saved configuration file—created by Emerson Network Power technical personnel or saved from a Liebert LDM unit—may be transferred from a PC to the Liebert LDM.

This feature allows for quick setup based on another unit's configuration or replacing a configuration file in an existing installation.

To upload the configuration file:

- Click on the **Load from File** button at the bottom of the Configuration window.
- In the Open window, navigate to the configuration file, then click **Open**.

After a short delay, a confirmation message appears. The Liebert LDM is now updated with all breaker and subfeed data from the configuration file that was just loaded.



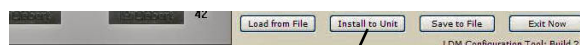
Load from File

5.5.4 Install Configuration Changes in the Unit

Whenever configuration changes are made using the Configuration program, the changes must be installed in the Liebert LDM using this step.

To install changes in the unit:

- Click on the **Install to Unit** button at the bottom of the Configuration window.
- During the upload, the circuit board will reboot.



Install to Unit

Once the rebooting process is complete, the configuration is now active.



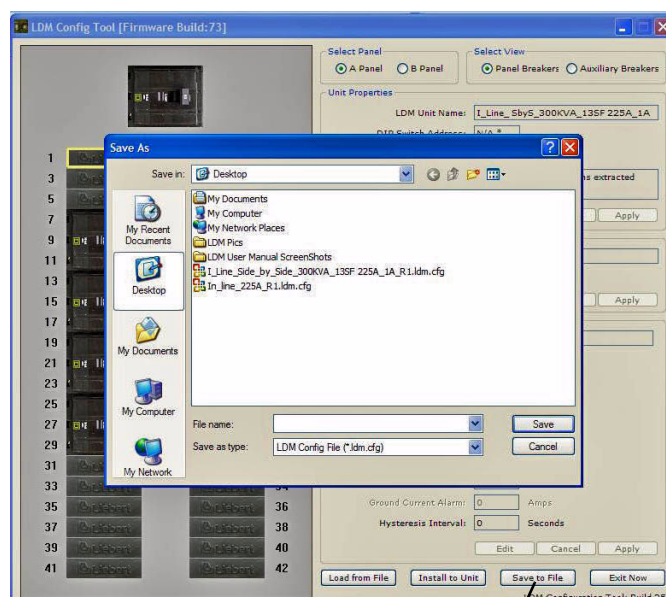
NOTE

*Always perform this step after making changes to the configuration. Configuration changes are not stored in the Liebert LDM until the **Install to Unit** button is clicked.*

5.5.5 Save the Configuration File to Disk

Saving the configuration file creates a copy of the current configuration, ensuring a backup is available in the event of file corruption or some other problem.

- Click on the **Save to File** button at the bottom of the Configuration window.
- In the Save As window:
 - Specify the location where you want to save the file in the Save In box.
 - Enter a unique name in the File Name box.
 - Click **Save**.



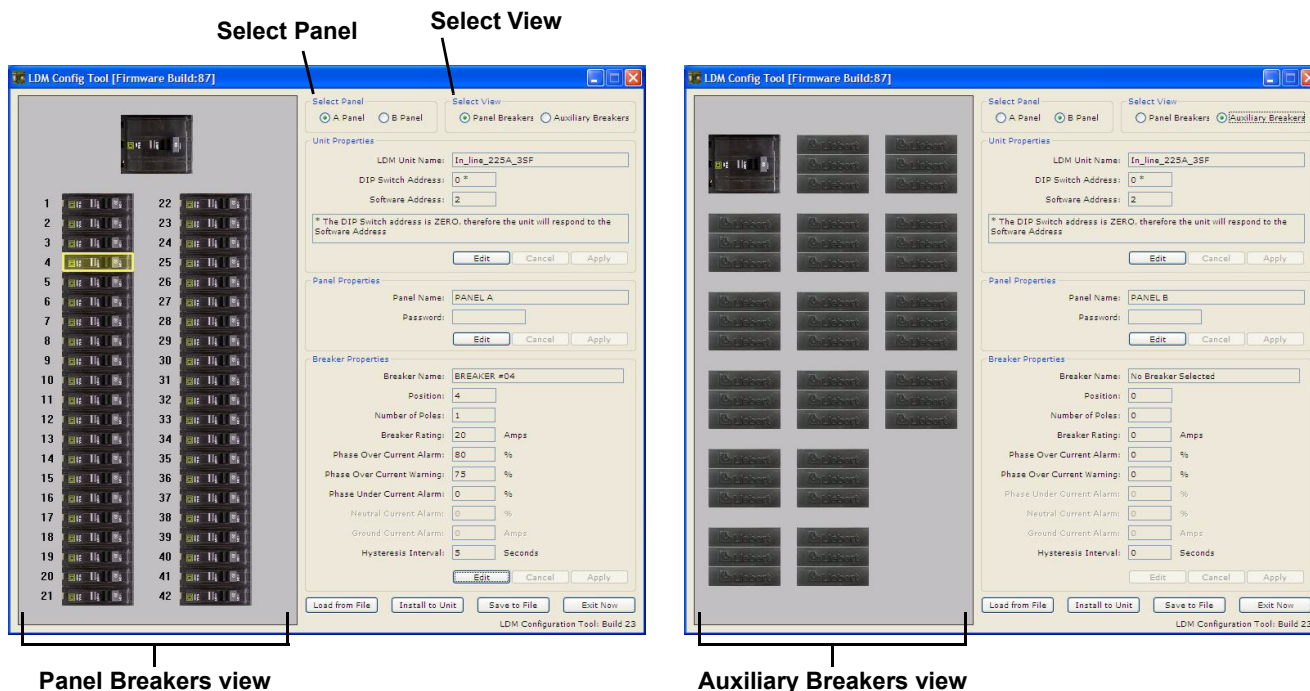
Save to File

5.5.6 Select Panel to View

Up to two panelboards may be connected to the Liebert LDM (see 4.1.1 - **Connecting Panelboards A and B**). Each may be viewed in the Configuration main window.

To switch the view to a different panel:

- In the Select Panel box, click on **Panel A** for Panelboard A or **Panel B** for Panelboard B. The panel name appears in the Panel Name box, as in the following examples.



5.5.7 Select Breakers to View

For each panelboard, two types of breakers may be configured.

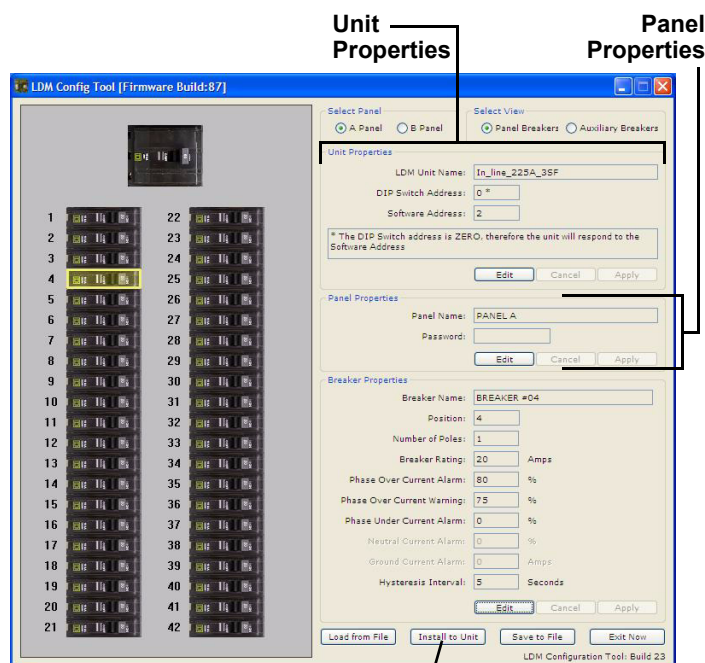
To switch the view, click on a button in the Select View box (shown above):

- **Panel Breakers** to view circuit breakers installed in the panelboard (see example above left).
- **Auxiliary Breakers** to view breakers installed outside the panelboard—for example, subfeed breakers (see example above right).

5.5.8 Edit the Liebert LDM Unit Properties

The Unit properties box displays the name, DIP switch address and software address of the Liebert LDM unit:

- **LDM Unit Name** - a name assigned to the Liebert LDM unit.
To make a change, click in the LDM Unit Name box, click **Edit** and enter a name, then click **Apply**.
- **DIP Switch Address** - the Modbus address determined by the Modbus address DIP switch setting.
The address can be changed by resetting DIP switches on S2 on the BCB.
- **Software Address** - a software-configured address that overrides the DIP Switch Address if the DIP switch address is set to zero.
To make a change, click in the Software Address box, click **Edit** and enter a value, then click **Apply**.
- When finished, click **Install to Unit** to upload the changes to the Liebert LDM.



Install to Unit
(click to save changes to Liebert LDM)



NOTE

*The configuration changes will not be stored in the Liebert LDM until the **Install to Unit** button is clicked.*

5.5.9 Edit the Panel Properties or Set a Password

The Panel properties box displays the name of the selected panelboard, as well as a Password box for creating a password to protect against unwarranted changes to the configuration:

- **Panel Name** - the default panelboard names are PANEL A and PANEL B.
To change a name, click in the Panel Name box, click **Edit** and enter a name, then click **Apply**.
- **Password** - a password required for users to make changes to the configuration file.
To create a password:
 - Click in the Password box, click **Edit** and enter a password.
The password may be up 10 characters long and may consist of any combination of numbers, letters and special characters. The password is not case-sensitive.
 - Click **Apply**.
- When finished, click **Install to Unit** to upload the changes to the Liebert LDM.

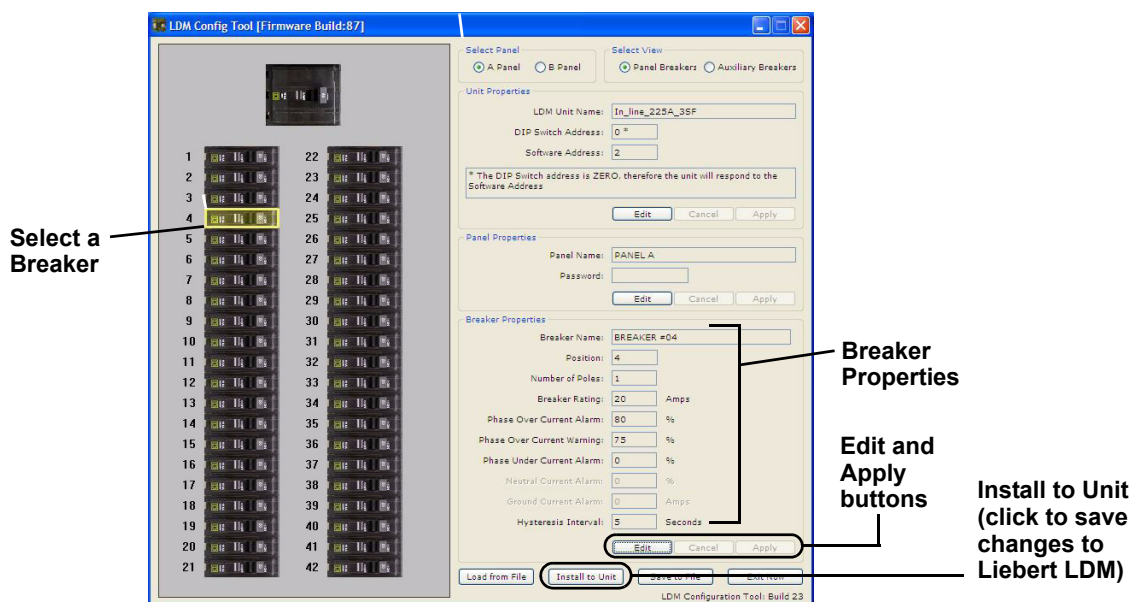


NOTE

*The configuration changes will not be stored in the Liebert LDM until the **Install to Unit** button is clicked.*

5.5.10 Edit the Breaker Properties

The Breaker Properties box displays the breaker name, rating, other parameters and alarm setpoints.



To view or change parameters and alarm setpoints of a breaker:

- Click on the breaker in the left pane. When selected, the breaker has a yellow outline.
- Refer to the following table to make changes.

Parameter	Description	To make a change:
Breaker Name	The name of the selected breaker. The default names are BREAKER #01, BREAKER #02, etc.	<ul style="list-style-type: none"> • Click in the Breaker Name box, click Edit and enter a name, then click Apply.
Position	The location of the selected breaker on the panelboard.	(Cannot be edited)
Number of Poles	The number of poles selected when the breaker was added to the panelboard.	(Cannot be edited)
Breaker Rating	The amperage for which the circuit breaker is rated. The default is 20A.	<ul style="list-style-type: none"> • Click in the Breaker Rating box, click Edit and enter a value, then click Apply.
Phase Overcurrent Alarm	Percentage of the breaker rating that triggers an overcurrent alarm. This value must be higher than the Phase Overcurrent Warning.	<ul style="list-style-type: none"> • Click in the Phase Overcurrent Alarm box, click Edit and enter a value, then click Apply.
Phase Overcurrent Warning	Percentage of the breaker rating that triggers an overcurrent warning. This value must be lower than the Phase Overcurrent Warning.	<ul style="list-style-type: none"> • Click in the Phase Overcurrent Warning box, click Edit and enter a value, then click Apply.
Phase Undercurrent Alarm	Percentage of the breaker rating that triggers an undercurrent alarm. The default is 0 (zero). Indicates no current is flowing through the breaker—either the breaker has tripped or the equipment has shut down.	<ul style="list-style-type: none"> • Click in the Phase Undercurrent box, click Edit and enter a value, then click Apply.
Neutral Current Alarm	Percentage of the breaker that triggers a neutral current alarm.	<ul style="list-style-type: none"> • Click in the Neutral Current Alarm box, click Edit and enter a value, then click Apply.
Ground Current Alarm	Amperage that triggers a ground current alarm.	<ul style="list-style-type: none"> • Click in the Ground Current Alarm box, click Edit and enter a value, then click Apply.

- When finished, click **Install to Unit** to upload the changes to the Liebert LDM.



NOTE

The configuration changes will not be stored in the Liebert LDM until the **Install to Unit** button is clicked.

5.5.11 Add or Delete a Circuit Breaker

After moving or removing circuit breakers in the panelboard, use the Configuration tool to add or delete in the configuration.

Run the configuration program using the steps outlined in **5.5.1 - Starting the Configuration Program**. Once connected, the configuration file that is currently programmed will be displayed.

5.5.12 Adding a Circuit Breaker



NOTE

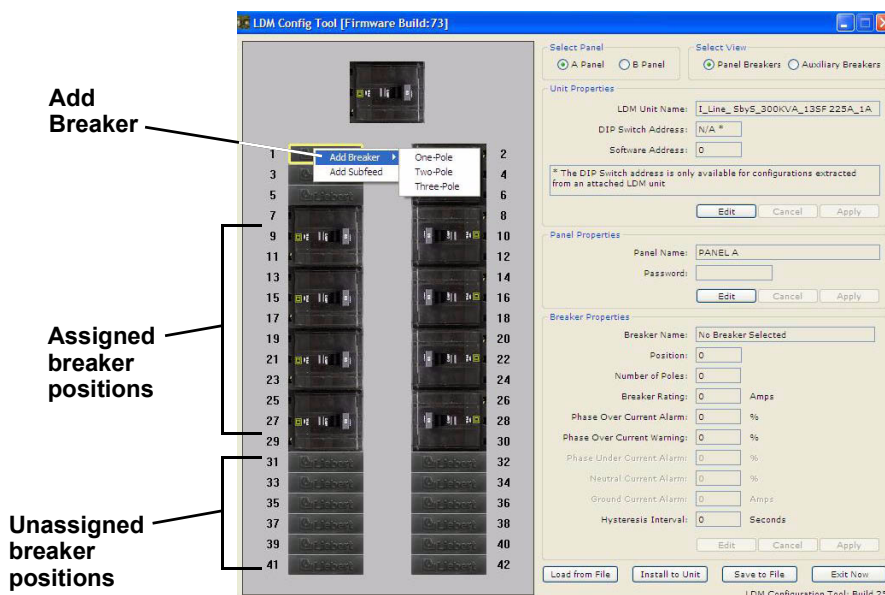
Check to make sure the location for the new breaker does NOT have a breaker assigned. If it does, first remove that breaker (see **5.5.14 - Delete a Breaker**), then return to this procedure.

An error message appears if you attempt to add a breaker to an assigned position.

- If NOT assigned, a breaker position is shown with a Liebert logo.
- An assigned breaker position appears as a picture of a circuit breaker.

To add a 1-, 2- or 3-pole circuit breaker:

- Run the Configuration program (see **5.5.1 - Starting the Configuration Program**).
- If needed, select the panel and breaker view with the new breaker:
 - In the Select Panel box, click on **Panel A** or **Panel B**.
 - In the Select View box, choose **Panel Breakers** if the new breaker is installed inside the panelboard or **Auxiliary Breakers** if located outside the panelboard.



- Right-click on the new breaker position in the left pane. The selected breaker has a yellow outline.
- In the pop-up menu, click on **Add Breaker**, then on the type of breaker that was installed: **One-Pole**, **Two-Pole** or **Three-Pole**.
- In the Breaker Properties at right, change the breaker's name, parameters and alarm setpoints as needed (see **5.5.10 - Edit the Breaker Properties**).
- When finished, click **Install to Unit** to upload the changes to the Liebert LDM.



NOTE

The configuration changes will not be stored in the Liebert LDM until the **Install to Unit** button is clicked.

5.5.13 Adding a Subfeed Breaker



NOTE

Check to make sure the location for the new breaker does NOT have a breaker assigned. If it does, first remove that breaker (see 5.5.14 - **Delete a Breaker**), then return to this procedure.

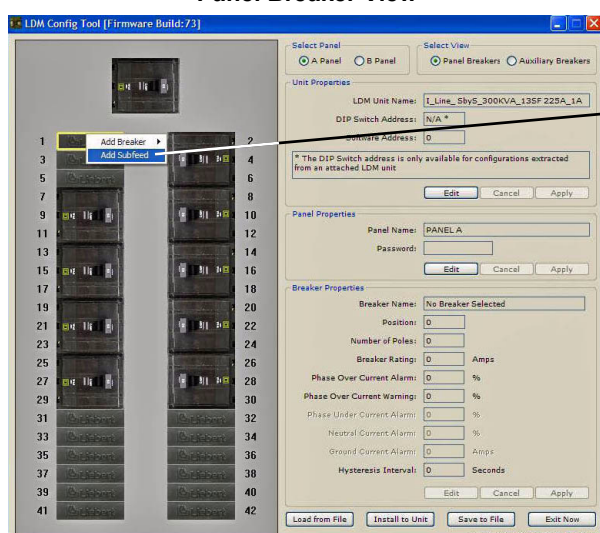
An error message appears if you attempt to add a breaker to an already assigned position.

- If NOT assigned, a subfeed breaker position is shown with three Liebert logos.
- An assigned subfeed breaker position appears as a picture of a 3-pole breaker.

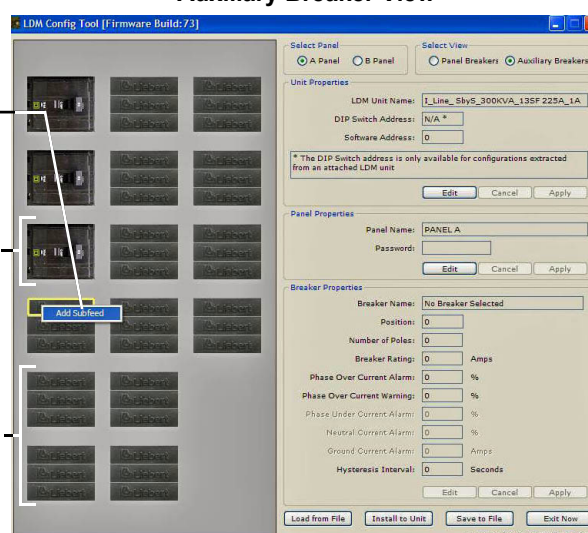
To add a 3-pole subfeed breaker circuit:

- Run the Configuration program (see 5.5.1 - **Starting the Configuration Program**).
- If needed, select the panel and breaker view with the new breaker:
 - In the Select Panel box, click on **Panel A** or **Panel B**.
 - In the Select View box, choose **Panel Breakers** if the new breaker is installed inside the panelboard or **Auxiliary Breakers** if located outside the panelboard.

Panel Breaker View



Auxiliary Breaker View



Add Subfeed

Assigned breaker positions

Unassigned breaker positions

- Right-click on the new breaker position in the left pane. The selected breaker has a yellow outline.
- In the pop-up menu, click on **Add Subfeed**.
- In the Add Subfeed window:
 - Click on the subfeed—for example, **Subfeed #1** or **Subfeed #2**—in the Select Subfeed box.



NOTE

The number of available subfeeds is determined by the interface board selected and whether cross-configuration is enabled.



- In the Select Size box, choose the rating of the new breaker: **100 Amp**, **225 Amp** or **400 Amp**.
- Click on the **Add Subfeed** button to return to the main Configuration window.
- In the Breaker Properties box of the Configuration window, change the subfeed breaker's name, parameters and alarm setpoints as needed (see 5.5.10 - **Edit the Breaker Properties**).
- When finished, click **Install to Unit** to upload the changes to the Liebert LDM.



NOTE

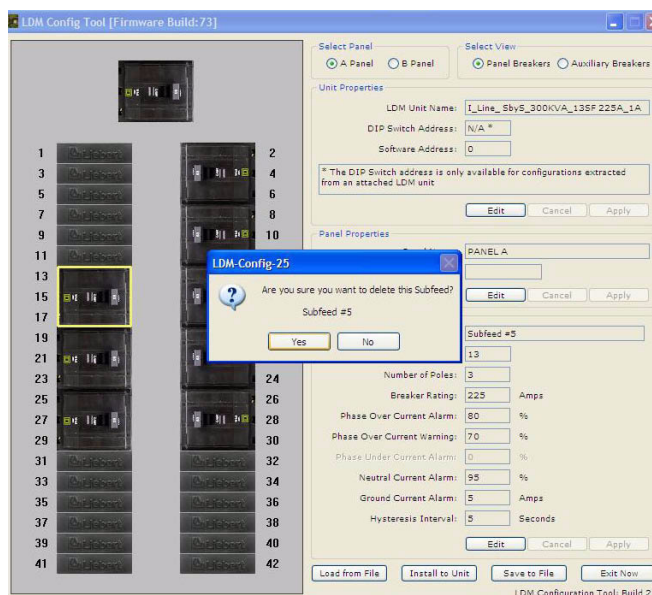
The configuration changes will not be stored in the Liebert LDM until the **Install to Unit** button is clicked.

5.5.14 Delete a Breaker

Removing a breaker from the configuration is required after moving or removing circuit breakers in the panelboard. This step must be performed before adding a breaker in the same position.

To delete a breaker:

- Run the Configuration program (see **5.5.1 - Starting the Configuration Program**).
- If needed, select the panel and breaker view with the breaker to be deleted:
 - In the Select Panel box, click on **Panel A** or **Panel B**.
 - In the Select View box, choose **Panel Breakers** if the breaker is installed inside the panelboard or **Auxiliary Breakers** if located outside the panelboard.



- Right-click on the breaker position in the left pane. The selected breaker has a yellow outline.
- In the pop-up menu, click **Delete**.
- A confirmation message appears, as shown above. Select **Yes** to delete the breaker (or **No** to cancel).
- Repeat as needed to delete other breakers.
- When finished, click **Install to Unit** to upload the changes to the Liebert LDM.



NOTE

*The configuration changes will not be stored in the Liebert LDM until the **Install to Unit** button is clicked.*

5.6 Upgrading the Firmware

The Flash program is used to upgrade the firmware on a Liebert LDM unit. It uses the service terminal port to erase the old firmware, copy the new firmware and reboot the unit.

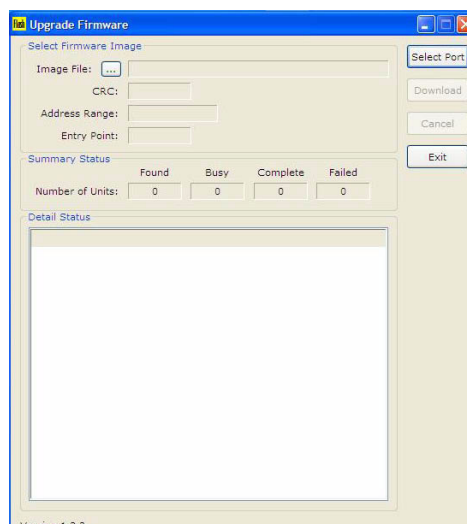


NOTE

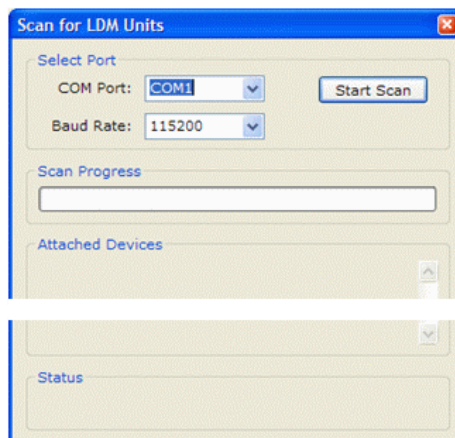
*Updating the firmware will not erase any configuration settings currently installed. No notice is given to customers when a new firmware version becomes available. Check Liebert's Web site periodically for any available updates (see **5.3 - Downloading the Software**).*

To upgrade the firmware:

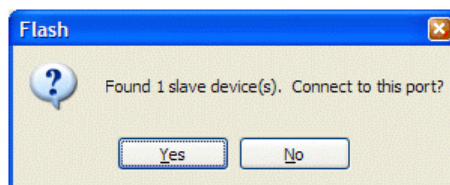
1. Make sure the Liebert LDM unit is powered ON.
2. Connect the PC to the Liebert LDM via the external DB9 connection. Refer to **5.2.1 - LDM Setup Port Connection**.
3. If needed, download the latest version of the software (see **5.3 - Downloading the Software**).
4. Run the file named **Flash x.x.x.exe** (where **x.x.x** is the version number).
5. In the Upgrade Firmware window, click the **Select Port** button.



6. In the Scan for LDM Units window:
 - Select the COM port from the drop-down list—for example, **COM1**.
 - Make sure the Baud Rate is **115200**.
 - Click the **Start Scan** button to check for a connection to the unit.

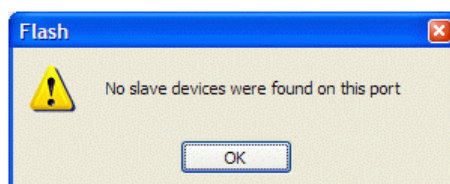


7. If the Liebert LDM unit is detected, a confirmation window appears. Click **Yes** to continue and proceed to **Step 8**.

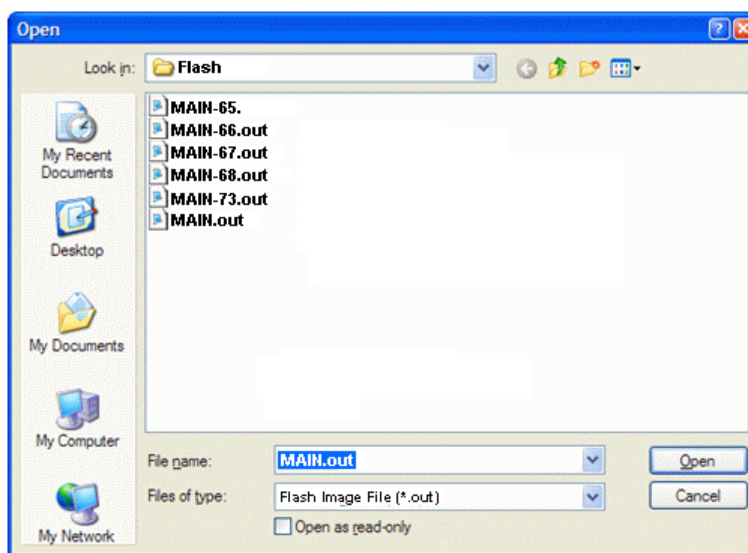


If the Liebert LDM unit is NOT detected, an error message appears. Click **OK** to return to the Upgrade Firmware window. Check to verify the following, then repeat **Step 6**:

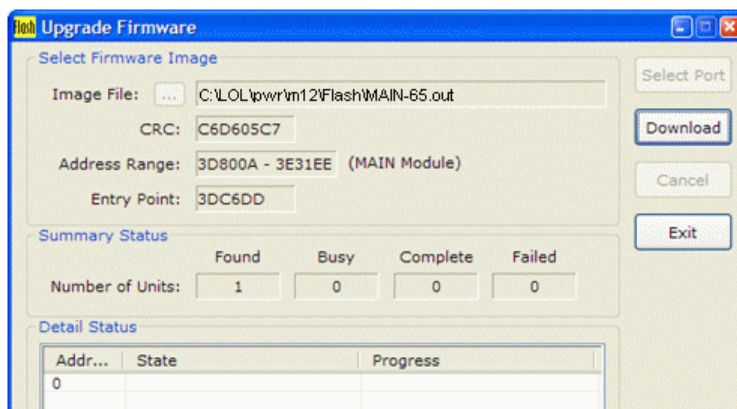
- The correct COM Port is selected and the Baud Rate is **115200**.
- A serial cable is properly connected to the unit (see **5.2.1 - LDM Setup Port Connection**).
- The Liebert LDM unit is powered ON.



8. In the Open window, locate the firmware file named **MAIN-xx.out** (where **xx** is the current version):
- Browse to the folder where the Flash files are located—the default folder is Flash.
 - Select the file you want to download—**MAIN-xx.out** (where **xx** is the current version).
 - Click the **Open** button.

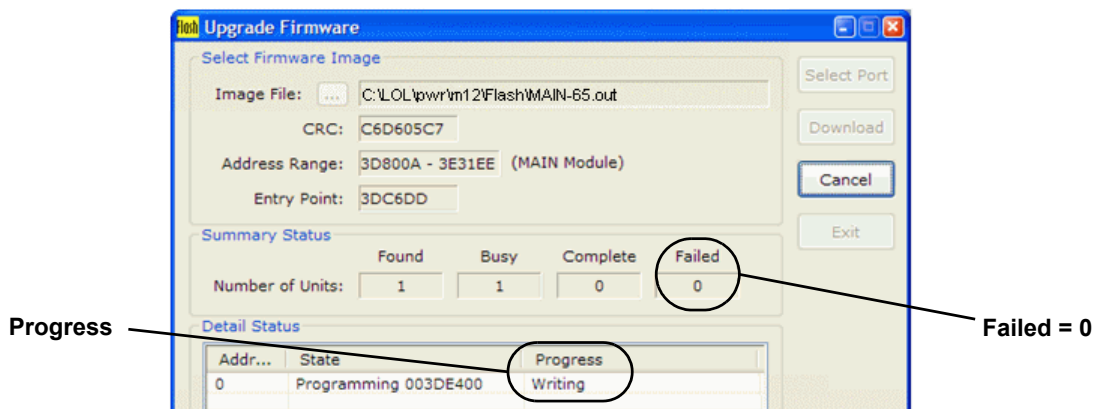
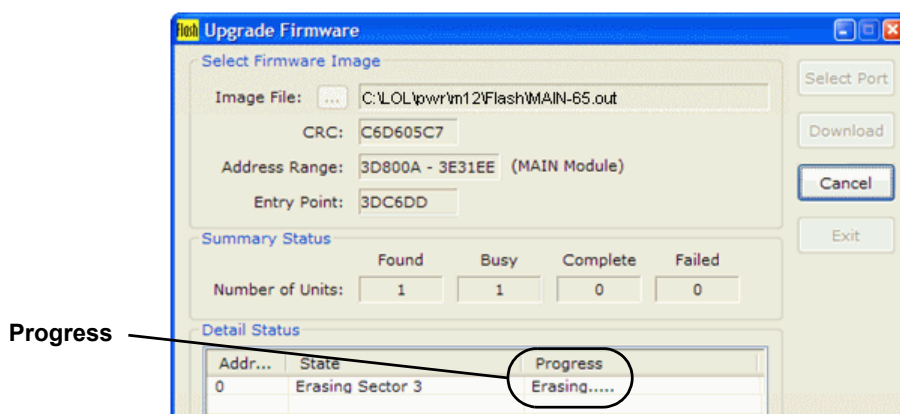


9. The Upgrade Firmware window appears. Click the **Download** button to continue.



10. Wait for the firmware upgrade to complete.

- The program erases the old image, then writes the new image, as shown below.



11. When the new image is loaded, the Flash program restarts the unit. Verify the following:

- In the Summary Status box, the Number of Units should be **0** under Failed.
- In the Detail Status box, **Running** should appear under Progress—this indicates that the BCB has been restarted successfully.

12. Click **Exit** to close the Flash program.

6.0 SPECIFICATIONS

ELECTRICAL	
Voltage	120 - 240 VAC (-13% to +6%)
Frequency	50 and 60Hz
Control Transformers Rating (Secondary Winding)	1A for Branch Circuits and Subfeeds 5A for Main Input Breaker
BSM Current	0.25A to 50A
CT Accuracy	2% for 1A to 50A 5% for 0.25A to 1A
Minimum Current	200mA
ENVIRONMENTAL	
Humidity	0-95%
Temperature (Non-Operating)	-68°F to 158°F (-20°C to 70°C)
Temperature (Operating)	32°F to 104°F (0°C to 40°C)

7.0 TROUBLESHOOTING / FAQs

1. How do I obtain the software necessary to monitor and configure the Liebert LDM?
 - The software package is available from Liebert's Web site:
http://www.liebert.com/product_pages/ProductDocumentation.aspx?id=72
2. What is contained in the downloaded software package?
 - The downloaded file from Liebert's Web site is a zip file that contains:
 - the flash program with a walk-through instruction
 - the configuration program
 - the monitor program
 - the latest firmware file (to update the Liebert LDM firmware using the flash program)
3. What should I do if the BMS is reporting an overcurrent alarm?
 - Verify the circuit is not actually overloaded.
 - Using the Configuration program, verify alarm setpoints and CT ratio is correct.
 - If settings are correct, verify that the BMS is operating correctly.
 - If the issue still exists, contact Liebert Services at 1-800-LIEBERT (1-800-543-2378) for assistance.
4. I get an error message "Incorrect Schema Version" when I try to run the Monitor tool or Configuration tool. What should I do?
 - Ensure that only one program—either Monitor or Configuration—is running at a time. You can't run both programs at the same time.
 - Ensure the latest firmware is loaded into the BCB. Please visit Liebert's Web site for firmware updates. If a firmware upgrade is necessary, refer to **5.6 - Upgrading the Firmware**.
 - Verify the PC is connected to the LDM Setup port and the cable is fully seated (see **5.2.1 - LDM Setup Port Connection**).
 - Verify the Liebert LDM unit has power (green LEDs on the BCB will be flashing).
5. How can I make a backup copy of the configuration file?
 - Connect to the external LDM Setup port (see **5.2.1 - LDM Setup Port Connection**).
 - Run the configuration program (see **5.5.1 - Starting the Configuration Program**).
 - At the bottom of the Configuration window, select **Save to File**. Navigate to a location on your PC to store the file (see **5.5.5 - Save the Configuration File to Disk**).

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